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Abstract

The fundamental objectives of image steganographic algorithm are to simultaneously achieve high payload, good visual imperceptibility, and security. This paper proposes a new data hiding method that increases visual quality and payload, as well as maintains steganographic security. The proposed scheme consists of two novel methods of parity-bit pixel value difference (PBPVD) and improved rightmost digit replacement (iRMDR). It partitions the cover image into two non-overlapping pixel blocks. The difference value between pixels in each block is used to determine the selection of PBPVD and iRMDR. According to the experimental results, the iRMDR method attains the best closest stego-pixels for good visual imperceptibility by resolving the region inconsistency problem in the existing RMDR method. In addition, the method reduces the risk of regular/singular (RS) detection attacks caused by its pixel-digit replacement nature. The PBPVD method exploits the pixel value difference (PVD) to adjust an extra parity bit that increases the payload while retaining the similar visual quality of PVD. Moreover, the iterative readjustment process of PBPVD minimizes the underflow/overflow problem. Overall, the proposed method achieves the steganographic objectives and reduces the detection artifacts against RS and pixel difference histogram analysis.

Keywords: Information hiding, Improved rightmost digit replacement, Parity bit PVD, PVD, Steganography

1. Introduction

Digital image steganography is one of the major categories of information hiding, which conceals confidential data into a digital image [1]. The fundamental issues in image steganography are achieving high hiding capacity, providing good visual imperceptibility, and ensuring security against steganalysis [2, 3].

Existing image steganography methods can be categorized into frequency [4-6] and spatial [7-20] domains. In the frequency domain, pixel values are first transformed by transformation function i.e. discrete cosine transform, or discrete wavelet transform, or integer wavelet transform [2]. Then, the